

RJH1CM6DPQ-E0

1200V - 20A - IGBT

Application: Inverter

R07DS0521EJ0600

Rev.6.00

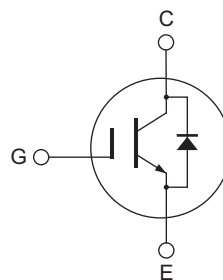
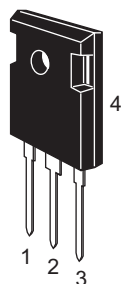
Oct 03, 2014

Features

- Short circuit withstand time (10 μ s typ.)
- Low collector to emitter saturation voltage
 $V_{CE(sat)} = 2.1$ V typ. (at $I_C = 20$ A, $V_{GE} = 15$ V, $T_a = 25^\circ\text{C}$)
- Built-in fast recovery diode ($t_{tr} = 200$ ns typ.) in one package
- Trench gate and thin wafer technology
- High speed switching
 $t_f = 120$ ns typ. (at $V_{CC} = 600$ V, $V_{GE} = 15$ V, $I_C = 20$ A, $R_g = 5 \Omega$, $T_a = 25^\circ\text{C}$, inductive load)

Outline

RENESAS Package code: PRSS0003ZE-A
 (Package name: TO-247)



1. Gate
2. Collector
3. Emitter
4. Collector

Absolute Maximum Ratings

($T_a = 25^\circ\text{C}$)

Item	Symbol	Ratings	Unit
Collector to emitter voltage / diode reverse voltage	V_{CES} / V_R	1200	V
Gate to emitter voltage	V_{GES}	± 30	V
Collector current	$T_C = 25^\circ\text{C}$	I_C	A
	$T_C = 100^\circ\text{C}$	I_C	A
Collector peak current	$I_{C(peak)}$ ^{Note1}	60	A
Collector to emitter diode forward current	I_{DF}	20	A
Collector to emitter diode forward peak current	$I_{DF(peak)}$ ^{Note1}	60	A
Collector dissipation	P_C ^{Note2}	290	W
Junction to case thermal resistance (IGBT)	θ_{j-c} ^{Note2}	0.43	$^\circ\text{C}/\text{W}$
Junction to case thermal resistance (Diode)	θ_{j-cd} ^{Note2}	0.69	$^\circ\text{C}/\text{W}$
Junction temperature	T_j	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

Notes: 1. $PW \leq 10 \mu\text{s}$, duty cycle $\leq 1\%$

2. Value at $T_C = 25^\circ\text{C}$

Electrical Characteristics

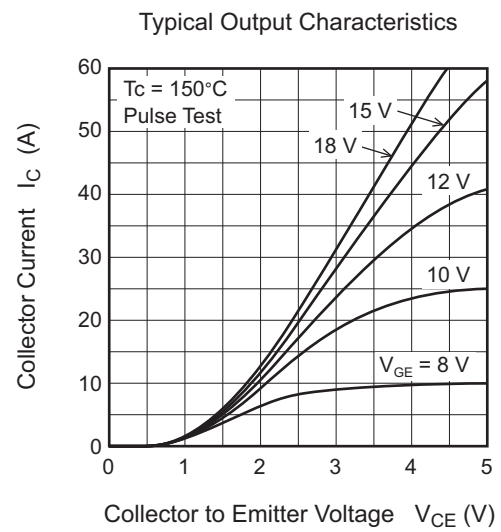
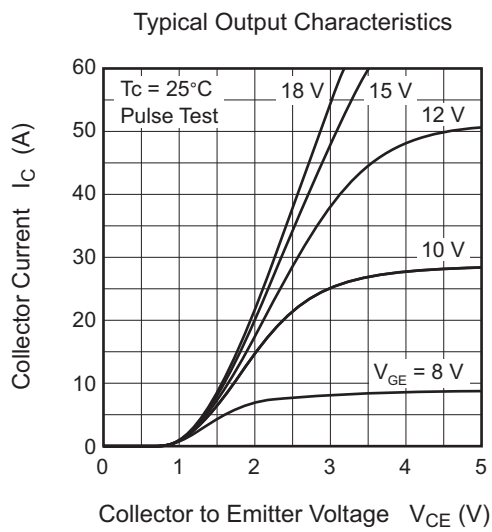
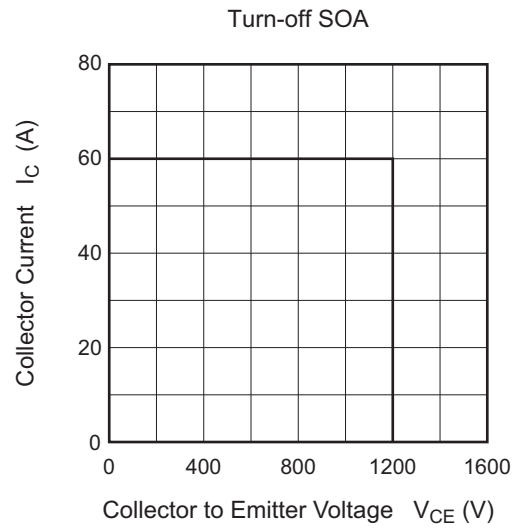
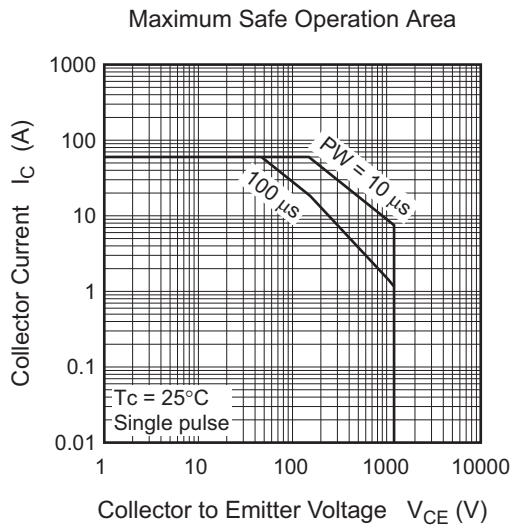
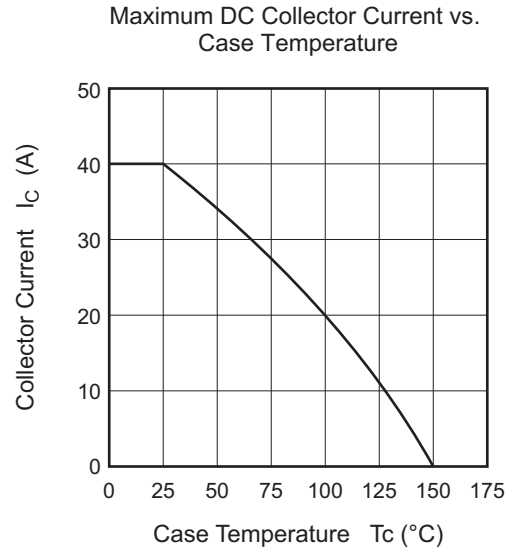
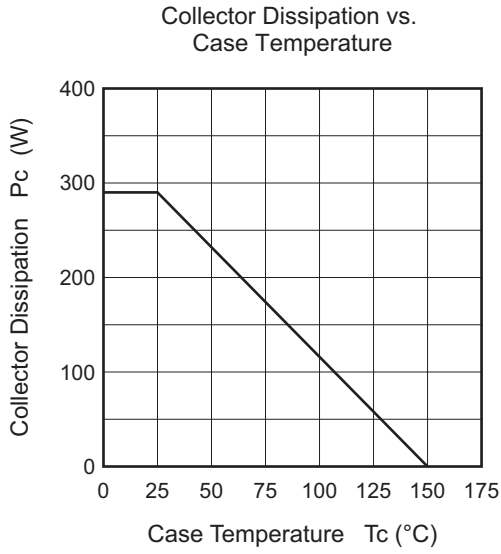
(Ta = 25°C)

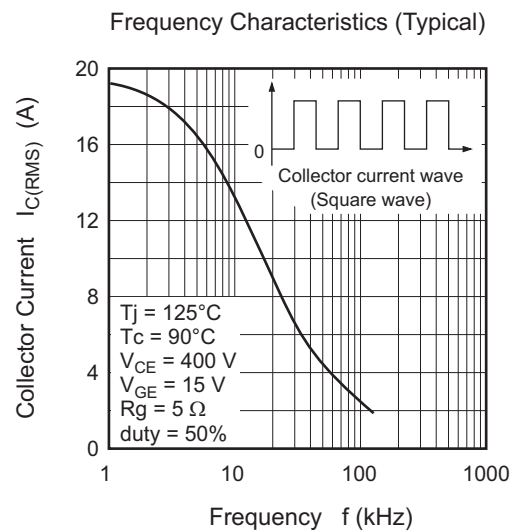
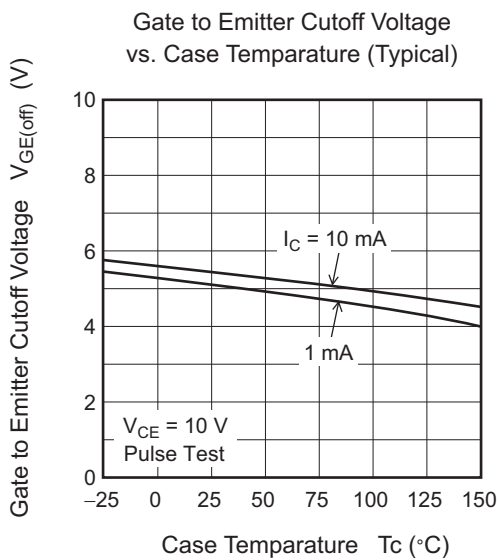
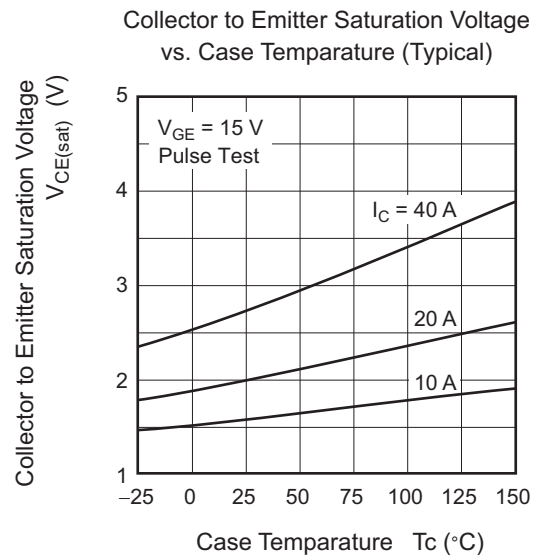
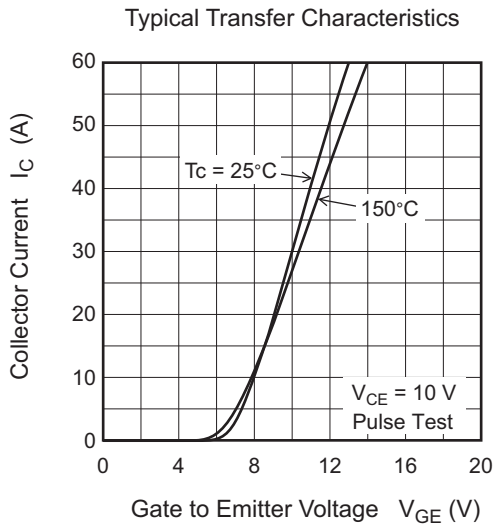
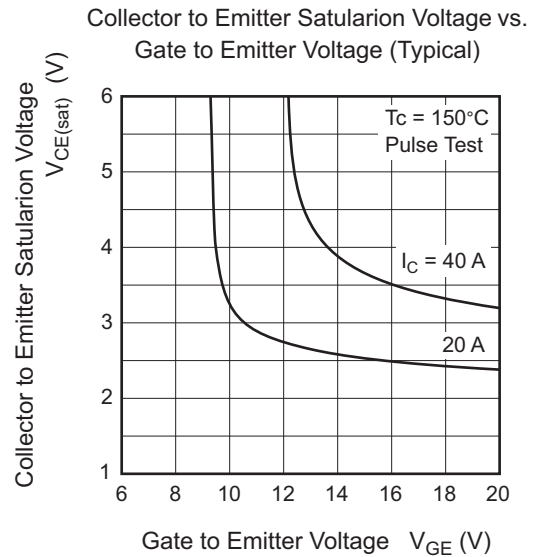
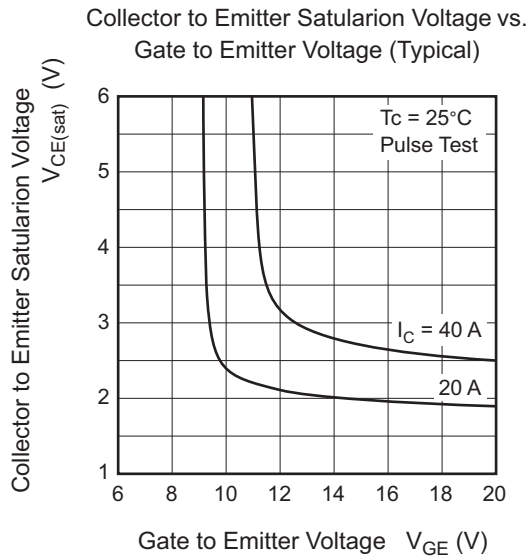
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero gate voltage collector current / Diode reverse current	I_{CES}/I_R	—	—	100	μA	$V_{CE} = 1200\text{ V}, V_{GE} = 0$
Gate to emitter leak current	I_{GES}	—	—	± 1	μA	$V_{GE} = \pm 30\text{ V}, V_{CE} = 0$
Gate to emitter cutoff voltage	$V_{GE(off)}$	4.5	—	6.5	V	$V_{CE} = 10\text{ V}, I_C = 1\text{ mA}$
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	2.1	2.7	V	$I_C = 20\text{ A}, V_{GE} = 15\text{ V}$ ^{Note3}
	$V_{CE(sat)}$	—	2.8	—	V	$I_C = 40\text{ A}, V_{GE} = 15\text{ V}$ ^{Note3}
Input capacitance	C_{ies}	—	1600	—	pF	$V_{CE} = 25\text{ V}$
Output capacitance	C_{oes}	—	85	—	pF	$V_{GE} = 0$
Reveres transfer capacitance	C_{res}	—	45	—	pF	$f = 1\text{ MHz}$
Total gate charge	Q_g	—	105	—	nC	$V_{GE} = 15\text{ V}$
Gate to emitter charge	Q_{ge}	—	17.5	—	nC	$V_{CE} = 300\text{ V}$
Gate to collector charge	Q_{gc}	—	51	—	nC	$I_C = 20\text{ A}$
Turn-on delay time	$t_{d(on)}$	—	45	—	ns	$V_{CC} = 600\text{ V}$
Rise time	t_r	—	21	—	ns	$V_{GE} = 15\text{ V}$
Turn-off delay time	$t_{d(off)}$	—	120	—	ns	$I_C = 20\text{ A}$
Fall time	t_f	—	120	—	ns	$R_g = 5\ \Omega$
Turn-on energy	E_{on}	—	1.8	—	mJ	Inductive load
Turn-off energy	E_{off}	—	0.9	—	mJ	
Total switching energy	E_{total}	—	2.8	—	mJ	
Short circuit withstand time	t_{sc}	—	10	—	μs	
						$V_{CC} \leq 720\text{ V}, V_{GE} = 15\text{ V}$ $T_C \leq 125^\circ\text{C}$

FRD forward voltage	V_F	—	1.7	—	V	$I_F = 20\text{ A}$ ^{Note3}
FRD reverse recovery time	t_{rr}	—	180	—	ns	$I_F = 20\text{ A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$
FRD reverse recovery charge	Q_{rr}	—	0.62	—	μC	
FRD peak reverse recovery current	I_{rr}	—	9.2	—	A	

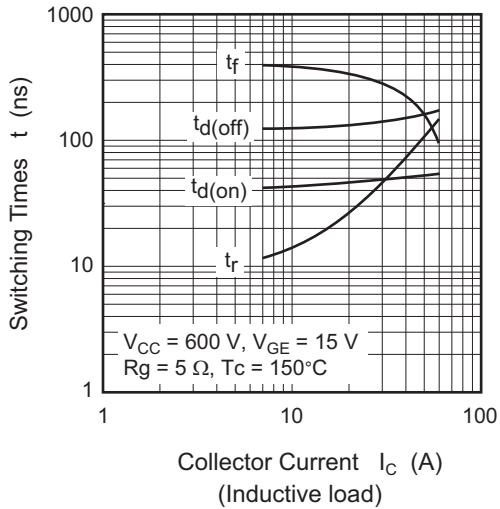
Notes: 3. Pulse test.

Main Characteristics

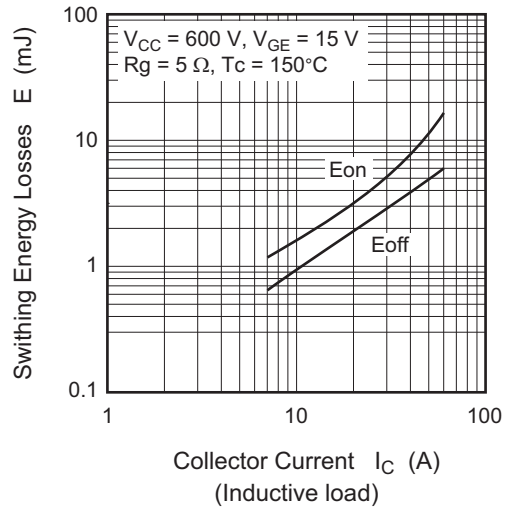




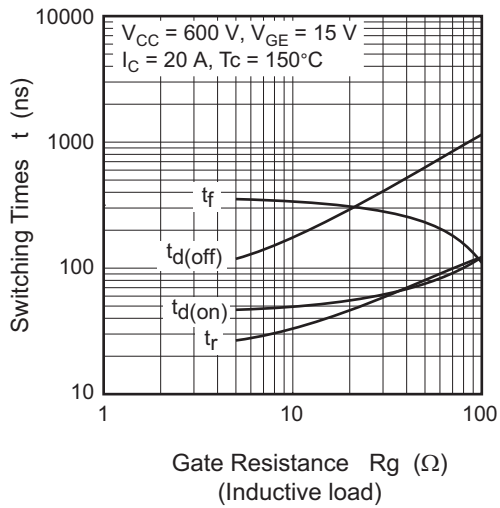
Switching Characteristics (Typical) (1)



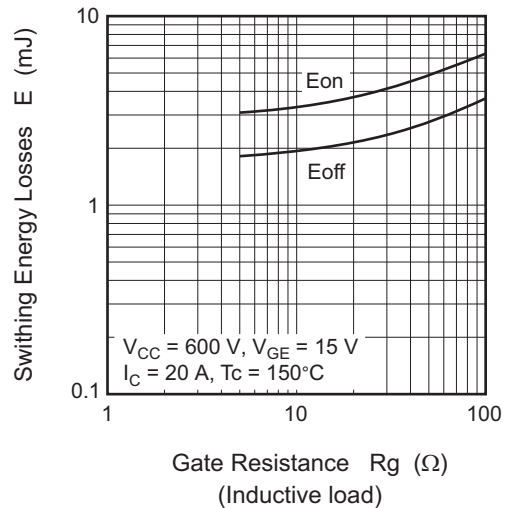
Switching Characteristics (Typical) (2)



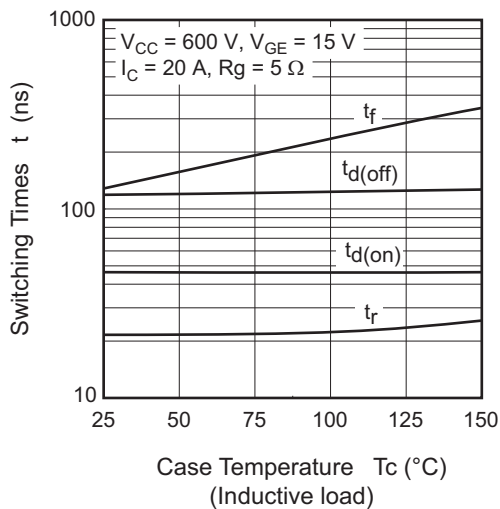
Switching Characteristics (Typical) (3)



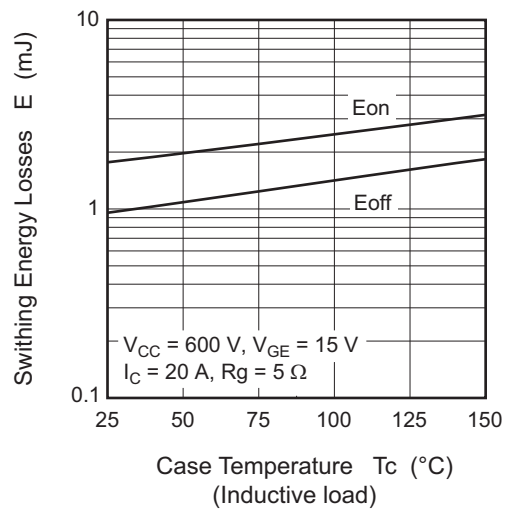
Switching Characteristics (Typical) (4)



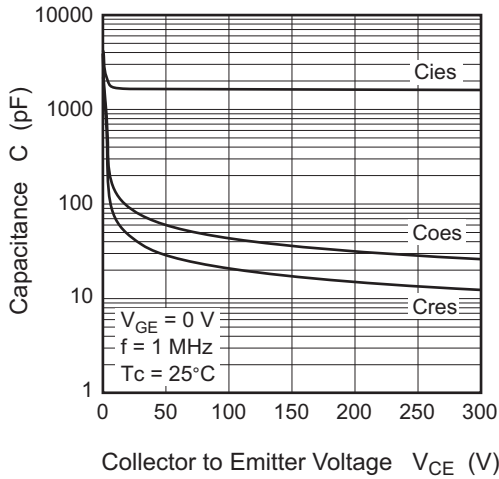
Switching Characteristics (Typical) (5)



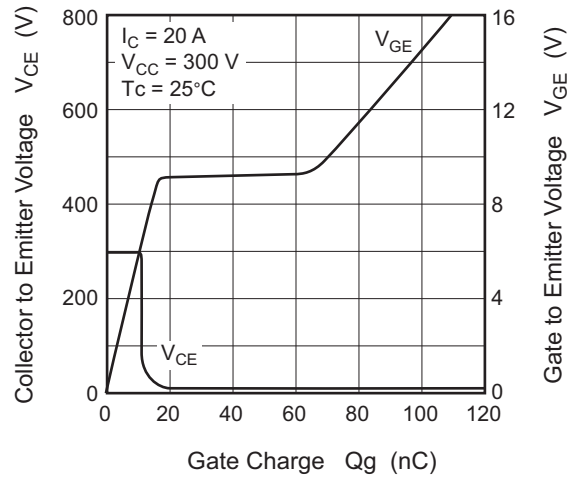
Switching Characteristics (Typical) (6)



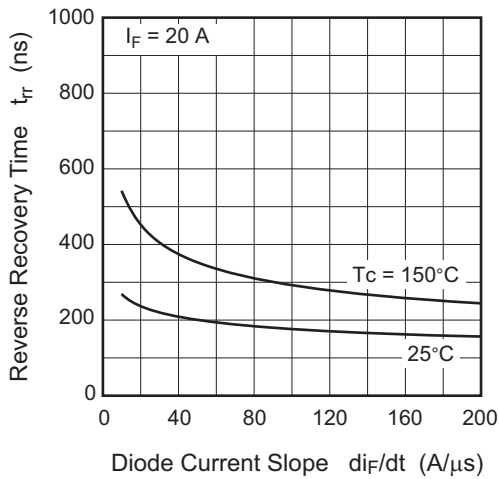
Typical Capacitance vs. Collector to Emitter Voltage



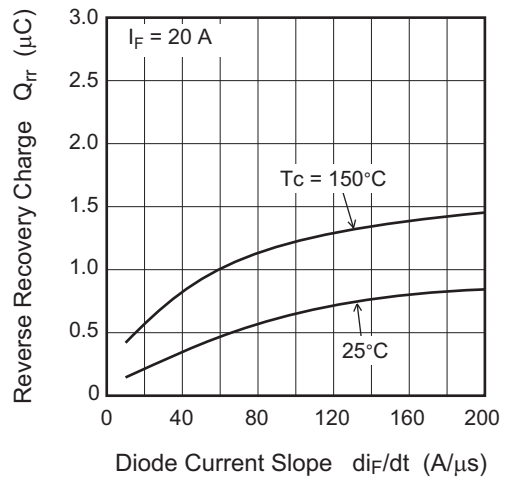
Dynamic Input Characteristics (Typical)



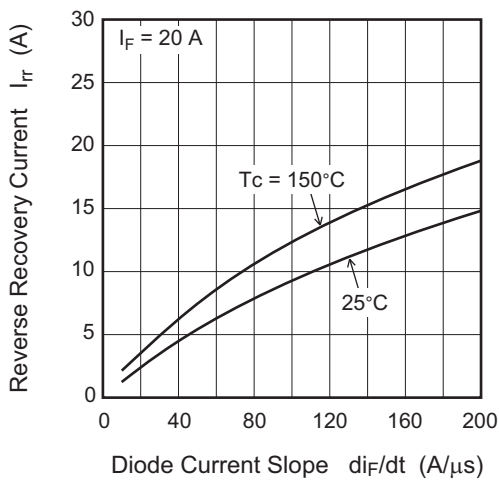
Reverse Recovery Time vs. Diode Current Slope (Typical)



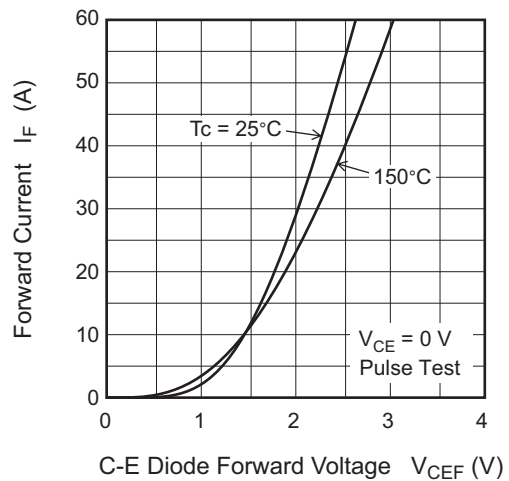
Reverse Recovery Charge vs. Diode Current Slope (Typical)

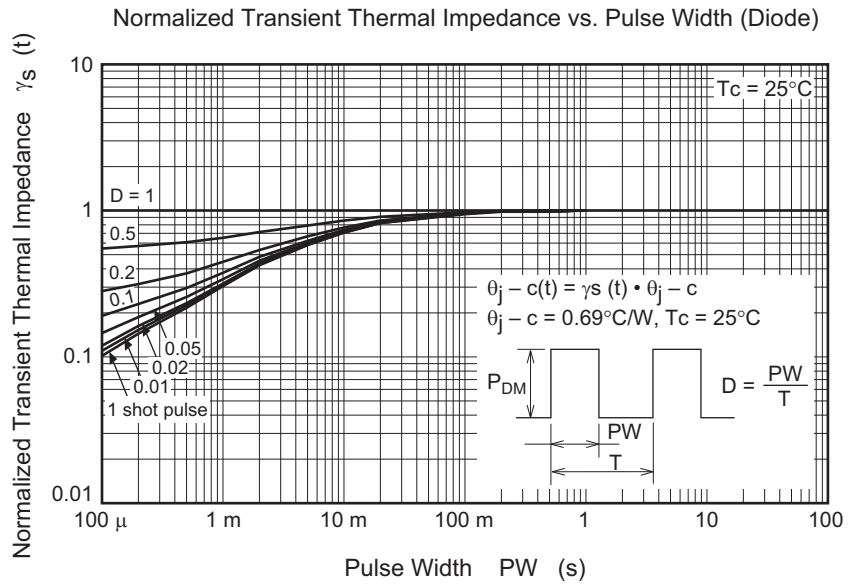
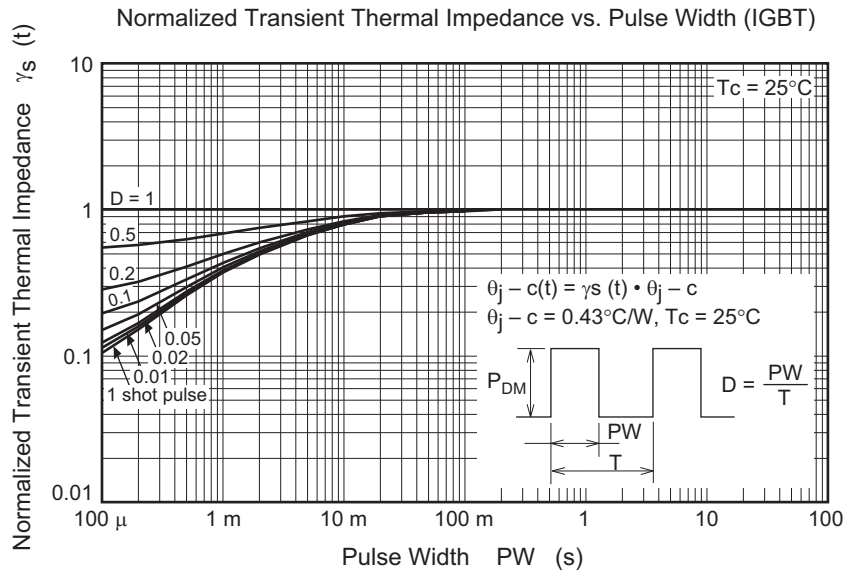


Reverse Recovery Current vs. Diode Current Slope (Typical)

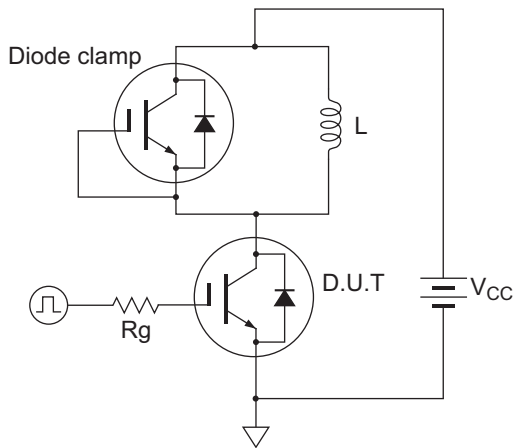


Forward Current vs. Forward Voltage (Typical)

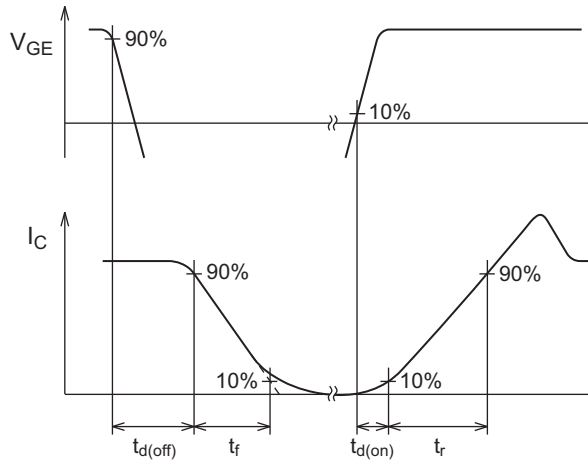




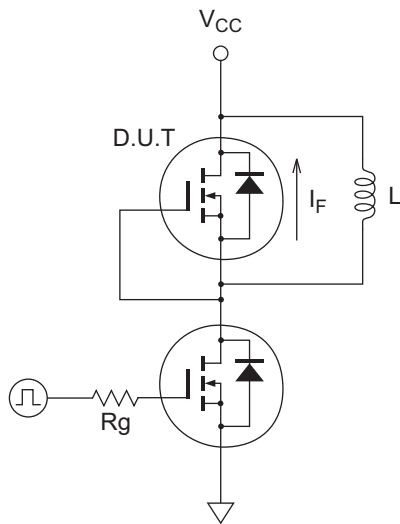
Switching Time Test Circuit



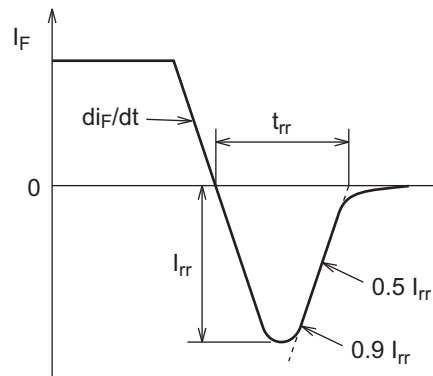
Waveform



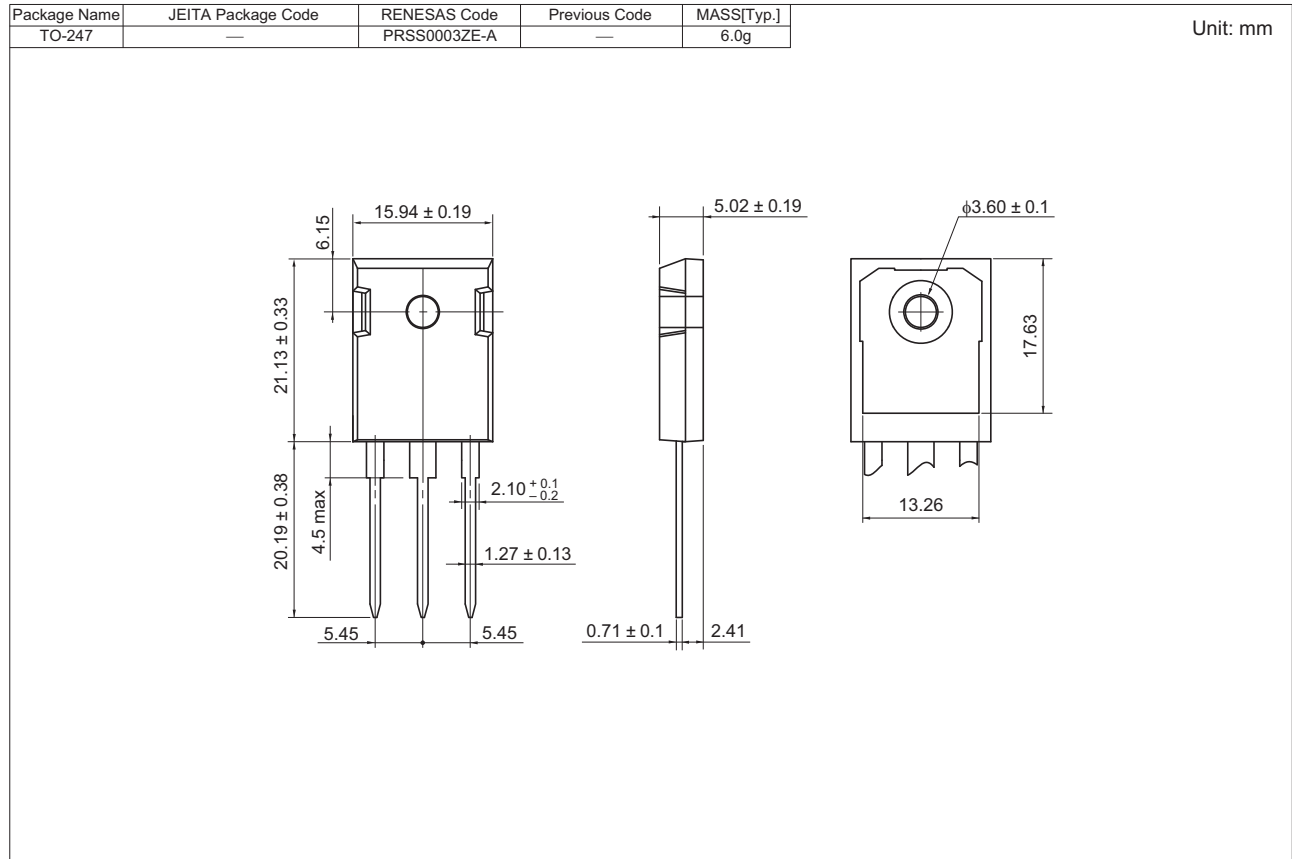
Diode Reverse Recovery Time Test Circuit



Waveform



Package Dimension



Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJH1CM6DPQ-E0#T2	450 pcs	Box (Tube)

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